

Curriculum Vitae

NENAD M. KOSTIĆ

Department of Chemistry, Iowa State University

Ames, Iowa 50011

EDUCATION AND EXPERIENCE

| | |
|----------------|---|
| 1976 | Diploma Chemist degree, University of Belgrade, Yugoslavia |
| 1978 - 82 | Doctoral student and teaching and research assistant, University of Wisconsin at Madison |
| 1982 | Ph.D. degree in inorganic chemistry, University of Wisconsin at Madison |
| 1982 - 84 | Research Fellow in Chemistry, California Institute of Technology |
| 1984 - 1989 | Assistant Professor of Chemistry, Iowa State University |
| 1986 - 1989 | Adjunct Assistant Professor of Biochemistry, Iowa State University |
| 1989 - present | Associate Professor of Chemistry and Adjunct Associate Professor of Biochemistry, Iowa State University |

CURRENT RESEARCH

Kinetics and mechanism of electron-transfer reactions of metalloproteins and metalloprotein complexes.

Transition-metal complexes as new bioconjugation reagents.

Selective hydrolysis of peptides and proteins, promoted by metal complexes.

Inorganic reagents for recognition and selective cleavage of DNA.

HONORS AND AWARDS

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| 1970 | The first place in the national (Yugoslav) competition in chemistry |
| 1971 | The first place in the state competition and the second in the national competition in chemistry |
| 1972 | A Yugoslav representative at the Second European Science Fair |
| 1974 & 1972 | Two Rector's awards, University of Belgrade |
| 1978 | Fulbright Fellowship for graduate study |
| 1981 | Outstanding Teaching Assistant Award, University of Wisconsin |
| 1981-82 | Procter and Gamble Fellowship, University of Wisconsin |
| 1987-88 | MASUA lecturer in chemistry, elected by the Midwestern Association of State Universities of America |
| 1988-93 | Presidential Young Investigator Award, National Science Foundation |
| 1991-93 | Sloan Research Fellowship, Alfred P. Sloan Foundation |

PUBLICATIONS

From undergraduate research

1. N. M. Kostić and S. R. Niketić,
"Novel Mixed Tris-complexes of Cobalt(III) with α - and β -Amino-acids: Isolation, Adsorption Cheomatography, and Absorption Spectra,"
J. Chem. Soc., Chem. Commun. 1977, 676-678.

From doctoral research

2. N. M. Kostić and R. F. Fenske,
"Molecular Orbital Calculations on Carbyne Complexes $\text{CpMn(CO)}_2\text{CR}^+$ and $(\text{CO})_5\text{CrCNEt}_2+$. Frontier-Controlled Nucleophilic Addition to Metal-Carbon Triple Bond,"
J. Am. Chem. Soc. 1981, 103, 4677-4685.
3. N. M. Kostić and R. F. Fenske,
"Molecular Orbital Calculations on Octahedral Carbyne Complexes: Bonding, Structure Deformations, and Frontier-Controlled Nucleophilic Additions,"
Organometallics 1982, 1, 489-496.
4. N. M. Kostić and R. F. Fenske,
"Criteria of Maximum Overlap and Minimum Orbital Energy in Molecular Orbital Studies of Conformations of Transition-Metal Carbene and Carbyne Complexes,"
J. Am. Chem. Soc. 1982, 104, 3879-3884.
5. N. M. Kostić and R. F. Fenske,
"Molecular Orbital Study of Bonding and Conformations in Dinuclear Complexes of Manganese and Chromium Containing Germanium, Sulfide, Dinitrogen or Phosphinidene Bridges,"
J. Organomet. Chem. 1982, 233, 337-351.
6. N. M. Kostić and R. F. Fenske,
"Molecular Orbital Studies of Bonding, Conformations, and Reactivity of Transition-Metal Complexes Containing Unsaturated Organic Ligands. Electrophilic and Nucleophilic Additions to Acetylide, Vinylidene, Vinyl, and Carbene Ligands,"
Organometallics 1982, 1, 974-982.
7. N. M. Kostić and R. F. Fenske,
"X α -SW Study of Bonding, Photoelectron Spectra and Photoionization Transition States in (Cyclobutadiene)iron Tricarbonyl,"
Chem. Phys. Lett. 1982, 90, 306-309.

8. N. M. Kostić,
"Phosphorus-Containing Analogues of Hydrocarbon Ligands. Molecular Orbital Study of Structure and Bonding in Potential Transition-Metal Complexes Containing Phosphoranium Ions as π Ligands,"
J. Organomet. Chem. 1982, 240, 71-81.
9. N. M. Kostić and R. F. Fenske,
"Molecular Orbital Study of Dinuclear Palladium Carbonyl Chlorides. Choice of the Bridging Ligand (CO versus Cl) and Question of Metal-Metal Bonding,"
Inorg. Chem. 1983, 22, 666-671.
10. N. M. Kostić and R. F. Fenske,
"Bonding in Phosphaferrocenes and Reactivity of the Phospholyl Ligand Studied by Molecular Orbital Calculations,"
Organometallics 1983, 2, 1008-1013.
11. N. M. Kostić and R. F. Fenske,
"Molecular Orbital Study of Bonding, Structure, and Substitution Reactions of Bis(borabenzene)iron,"
Organometallics 1983, 2, 1319-1325.
12. G. C. Hancock, N. M. Kostić and R. F. Fenske,
"Molecular Orbital Studies of Bonding, Photoelectron Spectra, and Photoionization Transition States of Bis(π -allyl)nickel,"
Organometallics 1983, 2, 1089-1098.

From postdoctoral research

13. N. M. Kostić, R. Margalit, C.-M. Che, and H. B. Gray,
"Kinetics of Long-Distance Ruthenium-to-Copper Electron Transfer in Pentaammineruthenium(histidine-83)azurin,"
J. Am. Chem. Soc. 1983, 105, 7765-7767.
14. R. Margalit, N. M. Kostić, C.-M. Che, H.-j. Chiang, I. Pecht, J. B. Shelton, J. R. Shelton, W. A. Schroeder, and H. B. Gray,
"Preparation and Characterization of Pentaammineruthenium(histidine-83) azurin and Thermodynamics of Intramolecular Electron Transfer,"
Proc. Nat. Acad. Sci. USA 1984, 81, 6554-6558.

From Iowa State University

15. D. D. Gummin, E. M. Ratilla, and N. M. Kostić,
"Variable-Temperature ^{195}Pt NMR Spectroscopy, A New Technique for the Study of Stereodynamics. Sulfur Inversion in a Platinum(II) Complex with Methionine,"
Inorg. Chem. 1986, 25, 2429-2433.
16. E. M. A. Ratilla, H. M. Brothers II, and N. M. Kostić,
"A Transition-Metal Chromophore as a New, Sensitive Spectroscopic Tag for Proteins. Selective Labeling of Histidine Residues in Cytochromes c with Chloro(2,2':6',2"-terpyridine)platinum(II) Chloride,"
J. Am. Chem. Soc. 1987, 109, 4592-4599.
17. L. Zhu and N. M. Kostić,
"Molecular Orbital Study of Stereoselective Addition of Ligands to the Hydride, Alkyl, and Halide Complexes of Iridium and Zirconium. The Question of Central Versus Lateral Attack,"
J. Organomet. Chem. 1987, 335, 395-411.
18. J. A. Galbraith, K. A. Menzel, E. M. A. Ratilla, and N. M. Kostić,
"Study of Stereodynamics by Variable-Temperature ^{195}Pt NMR Spectroscopy. Diastereomerism in Platinum(II) Thioether Complexes and Solvent Effects,"
Inorg. Chem. 1987, 26, 2073-2078.
19. L. M. Peerey and N. M. Kostić,
"Transition-Metal Compounds as New Reagents for Selective Cross-Linking of Proteins. Synthesis and Characterization of Two Bis(cytochrome c) Complexes of Platinum,"
Inorg. Chem. 1987, 26, 2079-2083.
20. L. Zhu and N. M. Kostić,
"Molecular Orbital Study of Coenzyme B_{12} . Activation of the Cobalt-Carbon Bond by Angular Distortions,"
Inorg. Chem. 1987, 26, 4194-4197.
21. H. M. Brothers II and N. M. Kostić,
"Noninvasive Tagging of Proteins with an Inorganic Chromophore. Selectivity of Chloro(2,2':6',2"-terpyridine)platinum(II) Toward Amino Acids, Peptides, and Cytochromes c,"
Inorg. Chem., 1988, 27, 1761-1767.
22. L. Zhu and N. M. Kostić,
"Molecular Orbital Study of Bimetallic Complexes Containing Conjugated and Aromatic Hydrocarbons as Bridging Ligands,"
Organometallics, 1988, 7, 665-669.

23. S. C. Shah, J. S. Johnson, H. M. Brothers II, and N. M. Kostić,
"Covalent Modification of Cytochrome c with a Chelate Hydrazone Complex of Platinum(II)," *J. Serb. Chem. Soc.*, 1988, 53, 139-148.
24. L. Zhu, L. M. Daniels, L. M. Peerey, and N. M. Kostić,
"A New Synthesis and Molecular Structure of Diferrocenylmercury Monohydrate," *Acta Cryst., Sect. C* 1988, 44, 1727-1729.
25. J. Chen and N. M. Kostić,
"Binuclear Transition-Metal Complexes as New Reagents for Selective Cross-Linking of Proteins. Coordination of Cytochrome c to Dirhodium(II)-m-tetraacetate," *Inorg. Chem.* 1988, 27, 2682-2687.
26. E. M. A. Ratilla and N. M. Kostić,
"Guanidyl Groups – New Metal-Binding Ligands in Biomolecules. Reactions of Chloro(2,2':6',2"-terpyridine)platinum(II) with Arginine in Cytochrome c and with Other Guanidyl Ligands," *J. Am. Chem. Soc.* 1988, 110, 4427-4428.
27. X.-Y. Zhou and N. M. Kostić,
"Concurrent and Reversible Changes of Color and of Phase in Aqueous Solution of (2,6-Pyridinedicarboxylato)chloroplatinate(II) Complex. Spectroscopic and Crystallographic Studies of the Discrete Monomer and Evidence of a Stacked Polymer," *Inorg. Chem.* 1988, 27, 4402-4408.
28. N. M. Kostić,
"Selective Labeling, Cross-Linking, and Cleavage of Proteins with Transition-Metal Complexes," *Comments Inorg. Chem.* 1988, 8, 137-162.
29. L. M. Peerey and N. M. Kostić,
"Oxido-Reduction Reactions Involving the Electrostatic and the Covalent Complex of Cytochrome c and Plastocyanin. Importance of the Protein Rearrangement for the Intracomplex Electron-Transfer Reaction," *Biochemistry*, 1989, 28, 1861-1868.
30. N. M. Kostić,
"Organometallic Compounds: Workhorses of Chemistry." *Encyclopaedia Britannica Yearbook of Science* 1990, 146-159.

31. E. M. A. Ratilla, B. K. Scott, M. S. Moxness, and N. M. Kostić,
"Terminal and Bridging Coordination of Methylguanidine, Arginine, and Canavanine to Platinum(II). The First Crystallographic Study of Bonding Between a Transition Metal and a Guanidine Ligand,"
Inorg. Chem. 1990, 29, 918-926.
32. H. M. Brothers II and N. M. Kostić,
"Catalytic Activity of the Serine Proteases α -Chymotrypsin and α -Lytic Protease Tagged at the Active Site with a (Terpyridine)platinum(II) Chromophore,"
Biochemistry 1990, 29, 7468-7474.
33. X. Y. Zhou and N. M. Kostić,
"Steric Effects on the Selectivity of Protein Labeling with Chelate Complexes of Platinum(II),"
Polyhedron, 1990, 9, 1975-1983.
34. N. M. Kostić,
"Diprotein Complexes and their Electron-Transfer Reactions,"
Metal Ions in Biological Systems, 1991, 27, 129-182.
35. J. S. Zhou and N. M. Kostić,
"Kinetics of Static and Diffusive Electron Transfer between Zinc-Substituted Cytochrome c and Plastocyanin. Indications of Nonelectrostatic Interactions between Highly-Charged Metalloproteins."
J. Am. Chem. Soc., 1991, 113, 6067-6073.
36. L. M. Peerey, H. M. Brothers, II., J. T. Hazzard, G. Tollin, and N. M. Kostić,
"Unimolecular and Bimolecular Oxidoreduction Reactions Involving Diprotein Complexes of Cytochrome c and Plastocyanin. Dependence of Electron-Transfer Reactivity on Charge and Orientation of the Docked Metalloproteins,"
Biochemistry, 1991, 30, 9297-9304.
37. J. S. Zhou & N. M. Kostić,
"Reactions Between Cytochrome c and Plastocyanin Indicate that Choice of Docking Sites on Protein Surfaces May Depend on Thermodynamic Driving Force for Electron Transfer,"
J. Am. Chem. Soc., 1991, 113, 7040-7042.
38. I. E. Burgeson and N. M. Kostić,
"Selective Hydrolysis of Unactivated Peptide Bonds, Promoted by Platinum(II) Complexes Anchored to Amino-Acid Side Chains,"
Inorg. Chem., 1991, 30, 4299-4305.
39. S. L. Pinnow, H. M. Brothers II, and N. M. Kostić,
"Selective Labeling of the Enzyme Papain with Chloro(terpyridine)platinum(II),"
Croat. Chem. Acta, 1991, 63, 1-10.

40. N. M. Kostić,
"Covalent Modification and Cross-Linking of Cytochrome c with Metal Complexes,"
invited chapter in a monograph on cytochrome c, accepted.
41. A. J. Lukes and N. M. Kostić,
"Disproportionation Involving an Organomercurial and a Sulfhydryl-containing Protein. Reaction between Chloromercuriferrocene and Bakers'-Yeast Cytochrome c,"
J. Inorg. Biochem., in press.
42. L. Qin and N. M. Kostić,
"Electron-Transfer Reactions of Cytochrome f with Flavin Semiquinones and with Plastocyanin. Importance of Protein-Protein Electrostatic Interactions and of Donor-Acceptor Coupling,"
submitted to Biochemistry.
43. J. S. Zhou, H. M. Brothers II, L. M. Peerey and N. M. Kostić,
"Metalloprotein Complexes for the Study of Electron-Transfer Reactions. Characterization of Diprotein Complexes Obtained by Covalent Cross-Linking of Cytochrome c and Plastocyanin with a Carbodiimide,"
submitted to Biochemistry.
44. E. M. A. Ratilla and N. M. Kostić,
"Photoreduction and Photoinduced Autoreduction of Ferricytochrome c,"
J. Serb. Chem. Soc., in press.
45. J. S. Zhou and N. M. Kostić,
"Photoinduced Electron Transfer from Zinc Cytochrome c to Plastocyanin is Gated by Surface Diffusion Within the Metalloprotein Complex,"
submitted to J. Am. Chem. Soc.
46. J. S. Zhou and N. M. Kostić,
"Photoinduced Electron-Transfer Reaction in a Ternary System Involving Zinc Cytochrome c and Plastocyanin. Interplay of Monopolar and Dipolar Electrostatic Interactions Between Metalloproteins,"
submitted to Biochemistry.

Manuscripts in Preparation

47. M. Suh, E. M. A. Ratilla, and N. M. Kostić,
"Binding to DNA of the Double-Decker Complex, $[\{Pt(trpy)\}_2Can]^{4+}$, a Nonintercalator that Gives Signs of Intercalation,"
to be submitted to Biochemistry.

48. E. M. Lempers and N. M. Kostić,
"Cleavage of DNA by the Trimetallic Complex $[\{Pt(trpy)\}_2Arg-\{EDTA Fe\}]^{2+}$ Acting
as a Fenton Reagent,"
to be submitted to Biochemistry.
49. L. Zhu and N. M. Kostić
"Palladium(II) and Platinum(II) Complexes Attached to Amino-Acid Side Chains
Promote Selective Hydrolysis of Unactivated Peptide Bonds,"
to be submitted to Inorg. Chem.